

REMARKS

As of this Amendment, claims 1-5 and 7-20 are pending in this application. Independent claims 1 and 8 have been amended to further clarify the exclusion of a chromium-containing layer. Claim 6 has been cancelled. The subject matter of claim 6 has been incorporated into independent claim 1. Support for the claim amendments can be found on page 1, line 8, page 2, line 15, page 3, lines 9-12, and page 5, lines 13-17 of the specification. No new matter has been added.

Claims 1, 2, 4-10, 15 and 17-20 stand rejected under 35 U.S.C. §103(a) for obviousness over U.S. Patent No. 6,015,628 to Urata et al. (hereinafter "Urata") in view of U.S. Patent No. 5,736,255 to Sasaki et al. (hereinafter "Sasaki"). Additionally, claims 11-13 stand rejected under 35 U.S.C. §103(a) for obviousness over Urata in view of Sasaki and U.S. Patent No. 6,180,177 to Nagashima et al. (hereinafter "Nagashima"). Claim 14 stands rejected under 35 U.S.C. §103(a) for obviousness over Urata in view of Sasaki and U.S. Patent No. 5,623,003 to Tanaka. Each of these rejections are respectfully traversed.

Amended independent claim 1 is directed to a paint composition for formation of corrosion and moisture resistant paint layer on a surface of a metal sheet. The composition includes a base resin and, dispersed therein, particles of a chromium-free corrosion inhibitor (A) prepared from porous silica particles to which Ca ion is bonded by ion-exchange, a polyphosphate (B) and optionally other pigment(s). The composition is positionable on a surface of a metal sheet without the interposition of a chromium containing layer. The composition further includes the corrosion inhibitor A and the polyphosphate B at an A/B weight ratio of 60/40 to 5/95 and at an A+B ratio of 5-150 parts by weight based on 100 parts by weight of resinous components.

Amended independent claim 8 is directed to a metal sheet having a paint layer. The layer includes a base resin, and dispersed therein, particles of a chromium-free corrosion inhibitor prepared from porous silica particles to which Ca ion is bonded by ion-exchange, a polyphosphate and optionally other pigment(s) formed on a surface of a base metal sheet. The composition is positioned on the surface of the metal sheet without the interposition of a chromium-containing layer.

Urata serves as the basis for all of the prior art rejections. As noted in the Office Action, Urata discloses a zinc-plated steel sheet coated with an organic composite.

Importantly, the coated steel sheet has on its surface a first chromate layer and a second organic film layer. As detailed below, Urata explains that the chromate layer is critical and necessary to achieve corrosion resistance in the coated sheet.

The secondary references are cited for teaching certain other aspects of coating compositions. Sasaki discloses a sealing material having a composition of 15-50 wt. % colloidal silicon dioxide and 50-85 wt. % aluminum metaphosphate. Nagashima discloses a surface treatment agent. The composition includes a cationic component, at least one acid component, a silane coupling-agent component and one or more water-soluble polymer components. Tanaka discloses a corrosion resistant coating having a resin composition of a polyester resin and an epoxy-modified polyester resin, a novolac-based epoxy-resin, a curing agent, and an anti-corrosion pigment, such as aluminum dihydrogen tripolyphosphate. These secondary references do not supplement the failure of Urata to teach or suggest a chromium-free coated steel sheet.

Urata fails to disclose or suggest a paint composition or a painted metal sheet as required in amended independent claims 1 and 8. In particular, Urata fails to teach or suggest a corrosion and moisture-resistant paint composition and painted metal sheet positioned on a surface of a metal sheet without the interposition of a chromium-containing layer. The composition of the present invention utilizes a combination of Ca-bonded silica particles and polyphosphate to attain corrosion resistance, and, therefore, eliminates the need for chromium in the corrosion inhibitor as well as the need for a chromium-containing layer interposed between the surface of the metal sheet and paint composition, as claimed in the amended independent claims. Urata on the other hand teaches a corrosion resistant organic composite coated steel sheet having a first chromate layer for obtaining corrosion resistance. In particular, col. 9, line 64-col. 10, line 7 of Urata teaches that it is the chromate layer in the invention that "inhibits the corrosion of the steel sheet". As such, Urata actually teaches away from a paint composition or painted metal sheet that excludes chromium, in particular, a chromium containing layer interposed between a metal sheet and paint composition. Moreover, Urata fails to teach or suggest utilizing the combination of Ca-bonded silica particles and polyphosphate to achieve corrosion resistance as in the amended independent claims.

In addition to Urata failing to teach or suggest achieving corrosion resistance with a chromium-free corrosion inhibitor prepared from Ca-ion bonded silica particles and polyphosphate, Urata fails to teach or suggest a paint composition of the claimed corrosion inhibitor and polyphosphate at a ratio of 60/40-5/95 and at a sum of 5-150 parts by weight based on 100 parts by weight of resinous components. While Urata discloses the possibility of using aluminum dihydrogen tripolyphosphate as a rust preventative additive and the possibility of ion-exchanged silica, it does not teach the combination of Ca-ion bonded silica and polyphosphate without the use of chromium to achieve corrosion and moisture-resistant paint composition, let alone the exact ratio of both constituents in a paint composition as in amended independent claim 1.

Moreover, none of Sasaki, Nagashima, or Tanaka add any teachings to the deficiencies of the Urata reference to render the present claims obvious. Sasaki merely discloses a sealing material using colloidal silicon dioxide. Nagashima merely discloses a surface treatment agent and Tanaka merely discloses use of aluminum dihydrogen tripolyphosphate as an anti-corrosion pigment. These references fail to teach or suggest a paint composition or painted metal sheet having Ca-bonded silica particles, in particular, the combination of Ca-bonded silica particles and polyphosphate.

Independent claims 1 and 8 now specifically exclude a chromium-containing layer and thereby distinguish over the prior art. Additionally, chromic acid from claim 10 has been deleted to further evidence that the present invention excludes even the use of chromium for chemically treating the surface of the sheet, as further supported by page 5, lines 13-17 of the specification.

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For all the forgoing reasons, Applicants believe that claims 1-5 and 7-20, as amended, are in condition for allowance. Reconsideration of the rejections and allowance of claims 1-5 and 7-20 are respectfully requested.

Respectfully submitted,

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